Featured Guest

By Peter E.J. Wells

# IT TAKES MORE THAN TREES TO MAKE A FOREST

If we are serious about reducing pollution and greenhouse gases, we have to focus on the output, not on the inputs.

WE ALL KNOW the folk saying, "Can't see the forest for the trees," and its warning that a focus on the details may obscure the big picture. Yet, our approach to date in seeking solutions to the growing emissions of greenhouse gases and their impact on the environment and climate has been characterized by individual changes instead of a comprehensive series of changes that contribute to the reduction of greenhouse gases. We can no more expect to turn the tide on climate change and environmental degradation through piecemeal measures than we could expect to create a healthy forest in our backyard by randomly planting trees chosen without regard to the soil, climate or needs of the animals that would make that forest home.

We have to start thinking of life on earth as a single complex process in which every activity impacts on everything else. A cottager in Muskoka on a muggy July afternoon notices that the birch trees on his property aren't looking very healthy, so he decides that he will take a sample branch into the garden centre the next day to see what to do. At dinnertime he goes into the cottage and without thinking turns on the air conditioner. Since dinnertime on a muggy summer's day is a time of peak electricity demand, even with every power plant in the province including the coal-fired plants generating at capacity, the province can't meet its needs. The system brings in power from Ohio, where more coal-fired plants generate acid gases to make the electricity running his air conditioner. The next morning at the garden centre the cottager is shocked to learn that his birch trees are stressed because the soil has been acidified by the rain and that the coal burning in southern Ontario and Ohio are the primary contributors.

Our approach to date in seeking solutions to the growing emissions of greenhouse gases and their impact on the environment and climate has been characterized by individual changes instead of a comprehensive series of changes that contribute to the reduction of greenhouse gases.

## Green Traps

Normally, a chemist developing a process would perform both a mass balance and energy balance and aim to optimize the process so as to obtain the greatest amount of product for the least amount of starting material and energy possible. On a commercial scale, factories in a particular industry cluster together so that

the by-products of one process can be used as feedstock for others. This can be seen in Sarnia's Chemical Valley and Alberta's Fort Saskatchewan. Our failure to perform such an analysis on the overall use of materials and energy in Canada and around the world has led us to devote large sums of capital to potential dead ends in searching for alternate clean sources of energy.

One such example is hydrogen. On a commercial scale, hydrogen is not available directly as a fuel. It is made either by chemical reactions or by hydrolysis of water. In both cases the energy in the hydrogen represents the chemical energy in the starting materials and the energy input during the reaction. Consequently, hydrogen is not a really a fuel but an energy storage medium. While water vapour may be all that comes out of a hydrogen-powered car, almost certainly hundreds of miles away carbon dioxide and acid gases were generated to make that hydrogen. The same is true of plug-in electric cars. Both approaches are more akin to sweeping the dust under the carpet than they are to a real cleaning.

More recently, we have begun to see the impact of the push to use ethanol from corn and other grains as a fuel for automobiles. In two years, the story has moved from the pages of journals such as *Nature,* to magazines such as *Scientific American* and now to the front page of *The Toronto Star.* While the rate of emission of carbon dioxide has not slowed appreciably, the price of corn has more than doubled and led to cutbacks in the production of pork, beef and poultry. Proponents of ethanol from corn claim that a litre of ethanol contains twice the energy used to make it, while opponents say that it is, at best, a break-even proposition. What makes more sense is to use corn stover and other agricultural and forestry waste since the incremental energy to bring it in for processing is less. If left in the field or forest, these materials would rot and produce methane and carbon dioxide. So long as processes that do not use more energy than is recovered from the resulting fuel can be developed, this approach will reduce the greenhouse impact of the whole operation.

The auto industry also provides another possible example of misdirected effort. In a controversial "Dust to dust" analysis of the environmental impact of various vehicles (cnwmr.com/nss-folder/automotiveenergy), CNW Marketing Research, Inc. concluded that when all the energy used to design, produce, drive and dispose of a vehicle was fully accounted for, a Toyota Prius hybrid vehicle actually appeared to have a greater energy cost than an Hummer. While the study has been criticized, it does raise the question whether we really know what we are doing in our efforts to save the environment.

## Focus on the Output

To this point, much of the effort on reducing pollution, and greenhouse gases in particular, has focused on reducing consumption. This, in turn, has led to investment in efficiency technologies such as LED and compact fluorescent lighting, higher efficiency furnaces and appliances and more effi-

cient cars and trucks. You might wonder what could possibly be wrong with such an approach, but if implemented on its own without other measures, increased efficiency actually increases total energy consumption and thus total emissions.

In the Nov. 27, 2007 edition of "StrategEcon," the economics and strategy newsletter of CIBC World Markets, Jeffrey Rubin and Benjamin Tal explain the efficiency paradox. Increased efficiency has the effect of lowering the unit cost of the inputs, which in turn means that greater output is possible for the same total cost. The effect of lower unit cost of manufacturing activity is to encourage more such activity. They discuss the introduction of the Watt steam engine with its external condenser that significantly increased the efficiency of steam engines. After an initial drop in coal consumption, they note that coal consumption increased tenfold in the 30 years following 1830. If we are serious about reducing pollution and greenhouse gases, we have to focus on the output, not on the inputs.

The National Round Table on the Environment and the Economy, a corporation initially set up by the Federal Government in 1988 to promote sustainable development, recently released a study "Getting to 2050: Canada's Transition to a Low-Emission Future" which discusses a variety of market-based models to encourage a reduction of greenhouse gases and air pollutants.

We have all faced a task we thought was too big for us. Once we start we are often surprised that steady effort can show results. The task will require the coordinated efforts of Canada's scientists, economists, experts in tax policy and Members of Parliament. Even if we ultimately fail to meet our Kyoto commitments because we started too late, we will be better off, whatever we achieve.

*Peter Wells B.Sc. LL.B. is a lawyer and a partner in the Toronto office of Lang Michener LLP. He is certified by the Law Society of Upper Canada as a specialist in civil litigation and intellectual property law (patents, trademarks and copyright) and is a special lecturer in Patent Law at the University of Windsor's Faculty of Law.*